

**IMAGE FORMING DEVICE**

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**Abstract**

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**PROBLEM TO BE SOLVED:** To collectively discharge the deteriorated developer, from plural developing units.  
**SOLUTION:** This device is provided with a discharging tube for concentratedly discharging the developer becoming in excess as a result of the developer newly replenished in the developing units 4Y, 4M, 4C and 4K, into the center shaft of the developing device assembly 4. The developer concentrated in the center shaft (in pipe shape) is transported to the shaft end through an auger disposed in the center shaft, allowed to fall in a connecting pipe 25 and join the connecting pipe 22. The connecting pipe 22 is the pipe for recovering the waste toner on a belt 5, and incorporate the auger. The waste toner and the deteriorated developer are recovered in a recovering box 17 through this connecting pipe 22.

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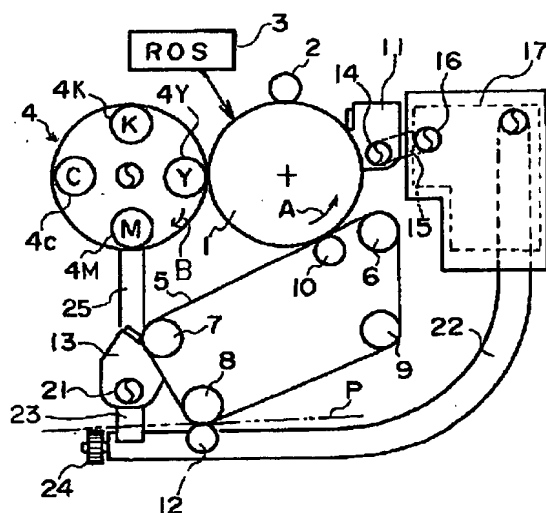
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(54) 【発明の名称】 画像形成装置

(57) 【要約】

【課題】 複数の現像器から、劣化した現像剤を一括して排出する。

【解決手段】 現像器4Y、4M、4C、4Kの中で新たに現像剤が補給されることによって過剰になった現像剤を、現像装置アセンブリ4の中心軸に集中して排出させる排出管を設ける。中心軸(パイプ状の)に集中された現像剤は中心軸内に設けられたオーガによって軸端に搬送され、連結管25を落下して連結管22と合流する。連結管22はベルト5の廃トナーを回収するためのパイプであり、オーガを内蔵する。廃トナーおよび劣化した現像剤はこの連結管22を通して回収箱17に回収される。



( 2 )

特開平 1 1 - 2 4 9 4 1 8

1

## 【特許請求の範囲】

【請求項 1】 現像剤を収容した複数の現像器を現像位置へ順次移動させて潜像担持体上の静電潜像を現像する画像形成装置において、  
前記複数の現像器を外周上に配置し、回転動作によって前記複数の現像器を前記現像位置へ順次移動させるための回転体と、  
前記現像器内の劣化した現像剤を該現像器から排出させるためにそれぞれの現像器に設けられた排出管と、  
前記劣化した現像剤を 1 か所に集中するため、前記各現像器の排出管に結合された共通配管とを具備したことを特徴とする画像形成装置。

【請求項 2】 前記排出管が、その一端が前記現像器内に開口した回収口を形成するとともに、  
前記回収口が上向きになったときに前記現像器内の現像剤を重力で該回収口から前記排出管内に取り込み、  
前記回転体が 1 回転することにより、前記回収口から取り込まれた現像剤が、前記排出管内を重力で移動して前記共通配管に導かれるように形状が決定されていることを特徴とする請求項 1 記載の画像形成装置。

【請求項 3】 前記現像器にトナーおよびキャリアからなる 2 成分の現像剤を補給する現像剤補給装置を具備し、  
前記排出管は、前記現像剤補給装置から新たに現像剤が補給されることによって過剰となった分の現像剤を取り込むように前記回収口を位置決めしたことを特徴とする請求項 2 記載の画像形成装置。

【請求項 4】 前記共通配管が、中空に形成された前記回転体の中心軸であり、該中心軸には前記排出管から流入した現像剤を該中心軸の端部方向へ搬送するための搬送手段を具備したことを特徴とする請求項 1～3 のいずれかに記載の画像形成装置。

【請求項 5】 前記搬送手段が、螺旋オーガであることを特徴とする請求項 4 記載の画像形成装置。

【請求項 6】 前記螺旋オーガが、前記回転体の回転により前記中空軸内周に対して相対的に変位して、前記現像剤を該中空軸の端部方向へ搬送するように構成されたことを特徴とする請求項 5 記載の画像形成装置。

【請求項 7】 前記搬送手段が、前記中空軸内周に形成された螺旋溝であり、前記現像剤が前記回転体の回転によって該螺旋溝内を該中空軸の端部方向へ搬送されるように構成されたことを特徴とする請求項 4 記載の画像形成装置。

【請求項 8】 前記搬送手段による現像剤の搬送速度は、前記排出管から取り込まれる現像剤が前記中空軸内に滞らないような速度に設定したことを特徴とする請求項 2～7 のいずれかに記載の画像形成装置。

【請求項 9】 前記排出管と中空軸との間には現像剤を逆流させないための弁手段が設けられていることを特徴とする請求項 2～8 のいずれかに記載の画像形成装置。

2

【請求項 10】 前記潜像担持体上の廃トナーを回収する潜像担持体清掃手段と、  
前記潜像担持体清掃手段で回収された廃トナーを収容する回収箱と、  
前記回収箱へ廃トナーを回収するための経路に前記搬送手段から現像剤を案内する管手段とを具備したことを特徴とする請求項 2～9 のいずれかに記載の画像形成装置。

【請求項 11】 前記現像器で現像された前記潜像担持体上の画像を記録媒体に転写する前段階で中間的に保持するための中間転写体と、  
前記中間転写体上の廃トナーを回収する中間転写体清掃手段と、  
前記中間転写体清掃手段で回収された廃トナーを収容する回収箱と、  
前記回収箱へ廃トナーを回収するための経路に前記搬送手段から現像剤を案内する管手段とを具備したことを特徴とする請求項 2～9 のいずれかに記載の画像形成装置。

【請求項 12】 前記現像器で現像された前記潜像担持体上の画像を記録媒体に転写する前段階で中間的に保持するための中間転写体と、  
前記中間転写体上の廃トナーを回収する中間転写体清掃手段と、  
前記潜像担持体上の廃トナーを回収する潜像担持体清掃手段と、  
前記中間転写体清掃手段および前記潜像担持体清掃手段で回収された廃トナーを収容する回収箱と、  
前記回収箱へ廃トナーを回収するための経路に前記搬送手段から現像剤を案内する管手段とを具備したことを特徴とする請求項 2～9 のいずれかに記載の画像形成装置。

【請求項 13】 前記回収箱の満杯を検知する満杯センサと、  
前記満杯センサの検知信号に応答して警報する警報手段とを具備したことを特徴とする請求項 10～12 のいずれかに記載の画像形成装置。

【請求項 14】 前記回収箱は、脱着自在なカセットを有していることを特徴とする請求項 10～13 のいずれかに記載の画像形成装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、電子写真式の画像形成装置に関するものであり、特に、劣化した現像剤を回収する廃トナー回収装置を有する画像形成装置に関する。

## 【0002】

【従来の技術】近年、電子写真方式の複写機やプリンタ等の画像形成装置において、フルカラー画像を形成できるようにしたものがある。このフルカラー画像

( 3 )

特開平 1 1 - 2 4 9 4 1 8

3

形成装置では複数色の現像剤に対応した複数の現像器を有している。いわゆる回転式現像装置では、画像形成装置本体に複数の現像器を回転自在に支持しており、画像担持体としての感光体ドラム（以下、「感光体」という）に、各色の現像器を順次当接させて静電潜像を可視化させている。

【0003】この画像形成装置で、現像剤としてトナーとキャリアからなる2成分現像剤を使用している場合がある。2成分現像剤は、画像形成の繰り返しにより現像剤の帯電性が低下するので、適宜新たな現像剤を補給する必要がある。この現像剤の補給作業を容易にするため、各現像器毎に現像剤を充填したカートリッジを設ける場合がある。このカートリッジの採用により現像剤の補給作業は簡易になったが、劣化した現像剤を回収する構造が大掛かりとなるという不具合が依然としてあった。

【0004】そこで、本発明者等は、現像装置の回転動作に伴って変化する前記カートリッジに対する重力の作用方向に着目し、この重力の作用により、劣化した現像剤を排出管を通じてカートリッジ内の回収スペースに排出するようにした回転式現像装置を提案している（特開平9-218575号公報）。

【0005】

【発明が解決しようとする課題】上記回転式現像装置では、重力の作用によって現像剤が自動的に回収されるので画像形成装置自体の大型化は避けられた。しかし、前記カートリッジ内には回収した現像剤を収容するスペースを設けていたので、相対的に新規現像剤を収容するスペースが小さくなるほか、古い現像剤を回収するための機構をカートリッジ内に形成する必要がある。このために、カートリッジの交換頻度が高くなる等ランニングコストが高くなるおそれがある。

【0006】本発明は、上記の問題点を解消し、現像剤補給の作業性を良好に維持しつつ、カートリッジのランニングコストを低減することができる画像形成装置を提供することを目的とする。

【0007】

【課題を解決するための手段】上記の課題を解決し、目的を達成するための本発明は、現像剤を収容した複数の現像器を現像位置へ順次移動させて潜像担持体上の静電潜像を現像する画像形成装置において、前記複数の現像器を外周上に配置し、回転動作によって前記複数の現像器を前記現像位置へ順次移動させるための回転体と、前記現像器内の劣化した現像剤を該現像器から排出させるためにそれぞれの現像器に設けられた排出管と、前記劣化した現像剤を1か所に集中するため、前記各現像器の排出管に結合された共通配管とを具備した点に第1の特徴がある。

【0008】この第1の特徴によれば、現像器内の劣化した現像剤は1か所に集中させられるので、個々の現像器の劣化した現像剤を個別に処置する必要がなく、共通

4

配管から排出される現像剤を一括して回収する等の処置を施すことができる。

【0009】また、本発明は、前記排出管が、その一端が前記現像器内に開口した回収口を形成するとともに、前記回収口が上向きになったときに前記現像器内の現像剤が重力で該回収口から前記排出管内に取り込まれ、前記回転体が1回転することにより、前記回収口から取り込まれた現像剤が、前記排出管内を重力で移動して前記共通配管に導かれるように該排出管が屈曲されている点に第2の特徴がある。

【0010】この第2の特徴によれば、現像器内の現像剤は該現像器を搭載した回転体の1回転毎に、回転体を回転させる以外の動力を用いることなく現像器内の現像剤が排出管に取り込まれて排出される。

【0011】

【発明の実施の形態】以下、図面を参照して本発明を詳細に説明する。図1は、本発明の一実施形態に係る画像形成装置の一例を示す図である。同図において、図示しないモータで矢印Aの方向に回転される感光体1の周囲には、帯電ロール2、露光装置（ROS）3、現像装置アセンブリ4、1次転写ロール10、感光体クリーナ11が配置されている。現像装置アセンブリ4はフルカラー現像のための4台の現像器4Y、4M、4C、4Kからなる。現像器4Y、4M、4C、4Kは、感光体1上の潜像を現像するためのイエロ（Y）、マゼンタ

（M）、シアン（C）、ブラック（K）の各色のトナーに対応し、それぞれが、交換可能な現像剤カートリッジ（以下、単に「カートリッジ」という）と、現像バイアスを与えるための現像ロールと、現像ロールヘトナーを供給するトナー供給装置および搬送装置とを有している（詳細は後述する）。現像に際しては、図示しないモータによって現像装置アセンブリ4を前記方向Aとは反対方向つまり矢印B方向に回転させ、当該色の現像ロールが感光体1に当接するように位置合わせされる。

【0012】感光体1上に順次形成された各色のトナー像は1次転写ロール10によって中間転写ベルト（以下、単に「ベルト」という）5上に順次転写され、4色のトナー像が重ね合わされる。ベルト5はロール6、7、8、9に張架されている。これらのうち、ロール6は駆動ロールとして機能し、ロール9はベルト5に張力を与えるテンションロールとして機能し、ロール8は2次転写ロール12のバックアップロールとして機能する。

【0013】ベルト5を挟んでロール7と対向する位置にはベルト5上の残留トナーを除去するベルトクリーナ13が設けられている。2次転写ロール12とベルト5との当接部は2次転写位置であり、ここで、図示しない搬送装置によって給送された記録紙Pにベルト5上のトナー像が2次転写される。

【0014】感光体1の表面から感光体クリーナ11に

(4)

特開平11-249418

5

よって除去された廃トナーは連結管15を通じて回収箱17に回収され、ベルト5からベルトクリーナ13によって除去された廃トナーは連結管23、22を通じて回収箱17に回収される。前記廃トナーは内部にオーガを有する搬送装置14、16、21等で各連結管15、22、23内を搬送される。なお、連結管22内にも図示しないオーガが実装されていて、このオーガは歯車24を通じて伝達される動力によって駆動される。

【0015】現像器4Y、4M、4C、4Kから回収された使用済みの劣化現像剤を排出する連結管25は連結管22に連結されており、前記現像剤はベルト5から回収された廃トナーと一緒に回収箱17に回収される。

【0016】前記回収箱17は、前記搬送装置16や連結管22の出口部分等を固定するハウジング部分と、廃トナーや劣化現像剤が堆積する引き出し部分(カセット)17aとに分割するようにして、使用者がそのカセット17aを引き出して廃トナーを廃棄したり、新たなカセット17aと交換する等の便宜を図るのが好ましい。この場合、前記カセット17aの引き出し方向は、搬送装置16等のオーガの軸方向、つまり図1の紙面に20垂直な方向と一致させるのがよい。

【0017】回収箱17またはカセット17a内の廃トナーや現像剤の満杯を検知するセンサと、このセンサの検知信号に応答して警報を発する警報装置、例えば、ブザーや表示器を設けるのがよい。使用者等がこの警報を認識して回収箱17内の廃トナー等を廃棄したり、カセット17aを交換したりできるからである。前記センサとしては、光学センサや超音波センサ等を用いることができる。例えば、光学センサを回収箱17またはカセット17a内に配置し、その光軸が、位置が上昇した廃トナーの上面で遮断されたときに検知信号を出力するようにすればよい。

【0018】動作時には、まず、帯電ロール2に電圧を印加して感光体1の表面を予定の電位で様にマイナス帯電させ、帯電された感光体1上の画像部分が予定の露光部電位になるようにROS3で露光を行い静電潜像が形成される。現像器4Y等の現像ロールには各色毎に予め設定された現像バイアスが印加されており、前記潜像は該現像ロールの位置を通過時にトナーで現像される。トナー像は1次転写ロール10でベルト5に転写され、さらに2次転写ロール12で記録紙Pに転写される。フルカラープリント時はベルト5上で4色のトナーが重ね合わされた後、記録紙Pに転写される。

【0019】続いて、前記現像装置アセンブリ4をさらに詳細に説明する。図2は、現像装置アセンブリ4、すなわち回転式現像装置の要部断面図であり、図3は現像装置に含まれる複数現像器のうちの1つの現像器(例えば現像器4Y)の断面図である。両図において、回転自在に設けられたサイドフレーム30のアーム31には、該アーム31の伸張方向に変位可能に現像器4Y、4

6

M、4Cおよび4Kが装着されている。現像器4Y、4M、4Cおよび4Kは同一構成であるので、以下の説明では現像器4Yで代表する。現像器4Yは現像器本体40とカートリッジ50から構成されている。現像器本体40内には、サイドフレーム30の回転軸方向(以下、単に「軸方向」という)が長手方向であるマグネットロールすなわち現像ロール41と、該現像ロール41と平行に延びる2本のスパイラルオーガ42、43が配置されている。現像ロール41が回転すると、該現像ロール41と同一駆動源で駆動されるスパイラルオーガ42は現像器本体40内に収容されている現像剤44を前記軸方向に攪拌しながら搬送する。

【0020】一方、スパイラルオーガ43はスパイラルオーガ42の搬送方向とは逆方向に現像剤44を攪拌しながら搬送して、現像剤44を現像ロール41に供給する。現像ロール41は現像剤44に含まれるキャリアを磁力によって吸着して磁気ブラシを形成し、キャリアに吸着したトナーを感光体1に供給する。

【0021】カートリッジ50は前記軸方向が長手方向である円筒体容器からなる。カートリッジ50には供給口26が設けられており、該供給口26は、カートリッジ50を現像器4Yに装着したときに現像器本体40側の略円筒状のケーシング51とつながり、新たな現像剤はこの供給口26を通じて現像器本体40に案内される。

【0022】カートリッジ50内には、内部の現像剤を攪拌・搬送するためのアジテータ27が設けられていて、現像装置アセンブリ4の回転によるアジテータ27の作用により新たな現像剤はケーシング51側へと送られる。ケーシング51内には、スパイラルオーガ52が設置されており、新たな現像剤は該スパイラルオーガ52により補給口53に導かれ、現像器本体40内に導入される。補給口53の出口には、フラップ54(図3では省略)が設けられており、このフラップ54は現像器4Yが位置Dにある時には開いているので、新たな現像剤が補給口53を通じて現像器本体40内に補給される。

【0023】前記スパイラルオーガ42、43および現像ロール41を支持しているケーシング55には、劣化した現像剤をケーシング55から排出するための排出管57が設けられ、その先端部をケーシング55内のスパイラルオーガ42の端部近傍に対向するように突出させている。該排出管57の先端は、スパイラルオーガ42の羽の周囲に沿うように屈曲されていて、その回転方向と対向する側に回収口58が開いている。ケーシング55からカートリッジ50側に折れ曲がっている排出管57の他端は、さらに現像装置アセンブリ4の軸28方向に折れ曲がって延長している(延長部等は図4、図5を参照してさらに後述する)。

【0024】回収口58は前記補給口53より上流側

(5)

特開平11-249418

7

(現像剤の搬送方向の)に向いており、スパイラルオーガ42、43によって攪拌・搬送されて現像器本体40内を一周した現像剤が該回収口53から外部に排出されるようになっている。

【0025】現像器4Yによる現像動作が終わって現像器4YがEの位置にくると、図示されているようにフラップ54は半開きになる。回収口58は上を向くようになるので、該回収口58前面近傍の現像剤は排出管57内に取り込まれる。続いて、現像器4Yが位置Fにくると回収口58から取り込まれた現像剤は、排出管57内でカートリッジ50方向へ移動する。さらに現像器4Yが位置Gにくると排出管57内の現像剤はサイドフレーム30を回転支持している軸(中空軸)28へ落とし込まれる。すべての現像器4Y、4M、4C、4Kにおいて使用されて劣化した現像剤は、それぞれに設けられる排出管57を通じて一か所に集中して排出される。

【0026】なお、排出管57の屈曲形状(方向)は、上述のように現像剤を回収口58から取り込んで中空軸28に集中させることができるように形成しており、これは現像装置アセンブリ4の回転方向に依存する。すなわち、図2のように、現像装置アセンブリ4の右側に感光体1がある場合には、現像装置アセンブリ4は反時計廻りに回転させなければならない。

【0027】次に、前記排出管57で集中された現像剤を前記連結管25等を通じて回収箱17へ回収するための構造を説明する。図4は現像器4Y等から排出された現像剤の排出経路を示す模式図であり、図2と同符号は同一部分を示す。同図において、回転自在に設けられた中空軸28には前記排出管57が結合されている。したがって、現像装置アセンブリ4がB方向に回転するに従って排出管57の回収口58から取り込まれた現像剤は、現像装置アセンブリ4の回転に伴って徐々に排出管57内を移動して中空軸28内に集中される。中空軸28内にはスパイラルオーガ29が装着されていて、集められた現像剤は、該中空軸28内をその端部まで搬送され、連結管25を通じて連結管22に接続される。

【0028】同図において、排出管57内に取り込まれた現像剤は符号Tで示す。この図のように、現像剤Tは重力方向にのみ移動するので、回収口48が上向きなときに取り込まれた現像剤Tは、現像装置アセンブリ4が1回転することにより中空軸28に落下する。

【0029】図5は、前記中空軸28の構造を示す断面図である。同図において、中空軸28の両端には前記サイドフレーム30とそれに対向しているサイドフレーム56が設けられている。中空軸28の一端は画像形成装置本体のフレーム59に設けられた軸受60で支持され、他端は画像形成装置本体の他方のフレーム61に設けられた箱体62の一の面に嵌め込まれた軸受63で支持されている。中空軸28内に設けられたスパイラルオーガ29の軸29aの一端は、箱体62の他の面に嵌め

8

込まれた軸受64で支持されている。軸29aの端部には歯車65が固定されていて、該歯車65を介して図示しない駆動源によって回転される。

【0030】箱体62は前記連結管25と連結されていて、中空軸28の端部からあふれた現像剤が連結管25に落ち込み、前記連結管22に誘導されるように構成されている。

【0031】前記サイドフレーム56には前記中空軸28と同軸に歯車66が設けられている。この歯車66にはステップモータ67の出力軸に結合された歯車68がかみ合わされていて、図示しない制御装置から入力される指令に基づいてモータ67が予定量回転することにより現像器4Y等が感光体1に対して位置決めされる。

【0032】なお、前記スパイラルオーガ29をモータ等によって積極的に回転させるのに代えて、前記軸29aを箱体62に固定してもよい。この場合は、現像装置アセンブリ4の回転に従って相対的にスパイラルオーガ29が回転することになり、所望のように現像剤を中空軸28の端部に搬送することができる。

【0033】また、スパイラルオーガ29によって現像剤を搬送するのに限らず、中空軸28の内面にスパイラル状に溝を形成し、現像装置アセンブリ4の回転に従い、この溝の螺旋の勾配を利用して現像剤が溝内を案内されるように構成してもよい。なお、前記スパイラルオーガ29やそれに代わるスパイラル状の溝は、排出管57から中空軸28内に取り込まれる現像剤の量よりも中空軸28端部から排出される現像剤の量の方が多くなるように、中空軸28の内径、ならびにオーガ29および前記溝の螺旋角、溝の幅および深さ等の条件を設定する。現像剤が中空軸28内に滞らないようにするためである。

【0034】さらに、現像装置アセンブリ4が回転したときに、中空軸28内に集められた現像剤が排出管57内に逆流しないように、弁またはシャックを設けるようにしてもよい。図6は、排出管57に設けた弁を示す要部断面図である。弁69は排出管57の壁面に設けられたピン70を中心に揺動自在に設けられており、図示のように中空軸28よりも下方に現像器が位置するようときは、重力の作用で排出管57を閉じる方向に揺動する。一方、中空軸28よりも上方に現像器が位置するようときは、重力の作用で排出管57を開くように揺動する。

【0035】上述のように、現像器4Y等で劣化した現像剤は、排出管57を通じて現像器本体40から現像装置アセンブリ4の中心部に集中され、廃トナーとともに回収箱17に回収される。したがって、カートリッジ50に個別に回収スペースを設ける必要がなく、またこのような回収スペースに現像剤を案内するための構造体をカートリッジ50内に設ける必要もない。そのために、カートリッジ50の構造を簡素化できるだけでなく、回

( 6 )

特開平 1 1 - 2 4 9 4 1 8

9

収スペースとして必要としていたスペースに補給現像剤を収容できるので、カートリッジ 50 が占めるスペースを有効に使用することができる。

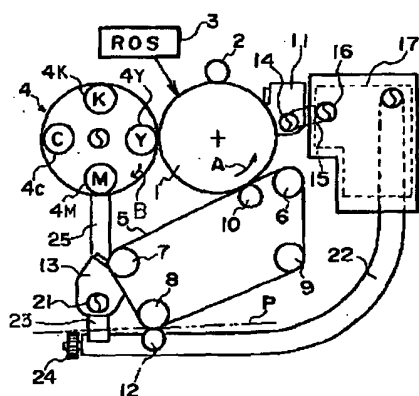
【0036】なお、現像剤は感光体 1 やベルト 5 から除去した廃トナーと一緒に回収箱 17 に回収するのに限らず、劣化した現像剤を専用に回収する回収箱を設け、それに回収するようにしてもよい。

【0037】

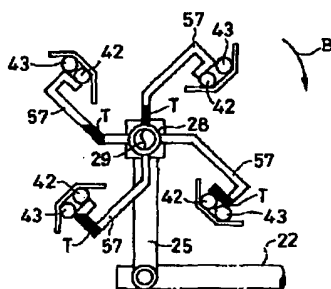
【発明の効果】以上の説明から明らかなように、本発明によれば、劣化した現像剤は現像器から外部に排出されるので、現像器内には劣化した現像剤を回収するスペースを設ける必要がない。特に、現像剤を補給するために補給装置を設ける場合、従来はこの補給装置に、劣化した現像剤を回収するように構成していたが、本発明では、このような構成をとることもないので、補給装置の構成は簡素化される。

【図面の簡単な説明】

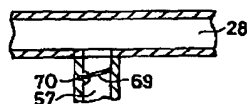
【図 1】



【図 4】



【図 6】



10

【図 1】 本発明の一実施形態に係る画像形成装置の構成を示す模式図である。

【図 2】 現像装置アセンブリの構成を示す断面図である。

【図 3】 現像装置アセンブリに含まれる現像器の構成を示す断面図である。

【図 4】 現像剤の回収経路を示す模式図である。

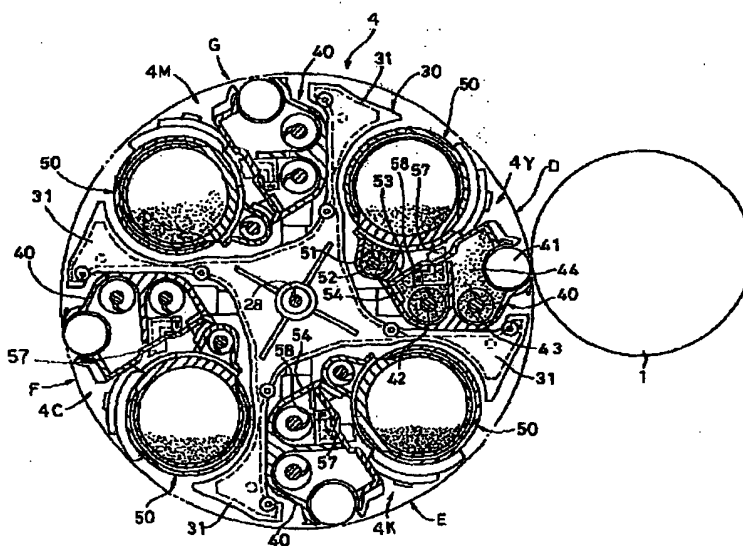
【図 5】 現像装置アセンブリの現像剤搬送装置を示す要部断面図である。

【図 6】 現像剤搬送経路に設けられた逆流防止の弁を示す要部断面図である。

【符号の説明】

1…感光体、 2…帯電ロール、 4…現像装置アセンブリ、 5…中間転写ベルト、 10…1次転写ロール、 12…2次転写ロール、 13…ベルトクリーナ、 15, 22, 23, 25…連結管、 28…中空軸、 29…オーガ、 57…排出管、 58…回収口

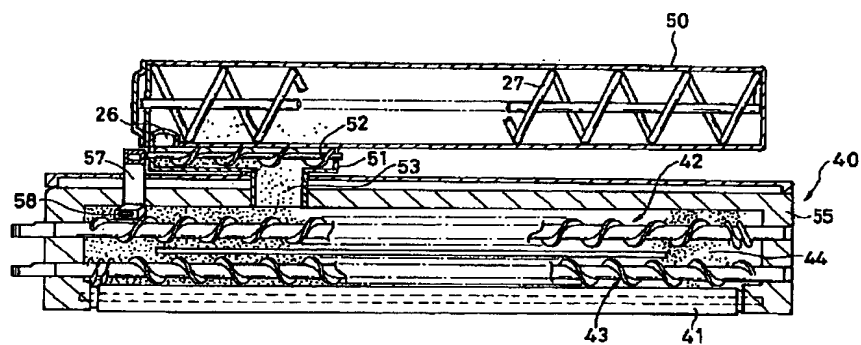
【図 2】



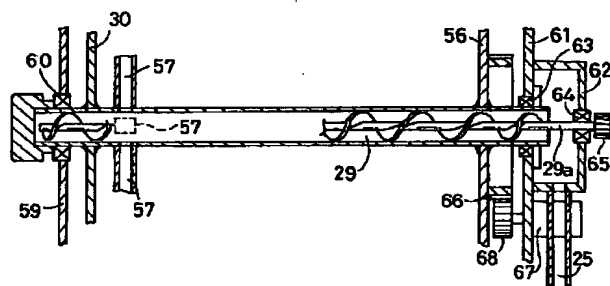
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特開平 1 1 - 2 4 9 4 1 8

【図 3】



【図 5】



フロントページの続き

(51) Int. Cl.<sup>6</sup>  
 G 0 3 G 15/16  
 21/10

識別記号

F I  
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 21/00

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CLAIMS

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## [Claim(s)]

[Claim 1] The development roll which equipped the cylinder-like front face arranged at the cylinder-like development sleeve and the aforementioned development sleeve inside which convey 2 component developer which consists of the developer, toner (A01), and carrier which are characterized by having the following requirements to a development field with the magnet roll which has two or more magnetic poles, The 1st developer stirring field which adjoins the development roll hold section and the aforementioned development roll hold section in which the aforementioned development roll is held, and is prolonged in the shaft orientations of a development roll, (A02) And while adjoining the aforementioned 1st developer stirring field, being arranged at the aforementioned development roll and an opposite side and the portion except shaft-orientations both ends being divided by the bridge wall with the aforementioned 1st developer stirring field The 2nd developer stirring field formed between the container outer walls to which shaft-orientations both ends connect with the aforementioned 1st developer stirring field, and extend along with the aforementioned bridge wall and its bridge wall, The development container which has the developer exhaust port which discharges the surplus developer of the opening of the developer which is established in the aforementioned container outer wall and supplies new 2 component developer to the interior, and the interior, The 1st conveyance member stirred while it is arranged to the aforementioned 1st developer stirring field and 2 component developer is conveyed in the direction of development roll axis, (A03) (A04) The 2nd conveyance member stirred while it is arranged to the aforementioned 2nd developer stirring field and 2 component developer is conveyed to the aforementioned 1st conveyance member and an opposite direction, the aforementioned developer exhaust port which adjoined the aforementioned (A05) opening of the developer, and was formed in the developer flow direction upstream.

[Claim 2] The aforementioned development container with which the developer exhaust port was formed in the downstream edge of the developer according to claim 1 characterized by having the following requirements, and the aforementioned (A06) 1st stirring field, and the opening of the developer was formed in the upstream edge of the aforementioned 2nd stirring field.

[Claim 3] The aforementioned developer exhaust port formed near the developer according to claim 2 characterized by having the following requirements, and the magnetic pole which makes the developer on the development sleeve of the aforementioned (A07) magnet roll exfoliate.

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## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the image formation equipment whole explanatory drawing equipped with the example 1 of the developer of this invention.

[Drawing 2] Drawing 2 is expansion explanatory drawing of a developer shown in aforementioned drawing 1, drawing 2 A is the IIA-IIA line cross section of drawing 4, and drawing 2 B is the IIB-IIB line cross section of drawing 4.

[Drawing 3] Drawing 3 is explanatory drawing of the development container shown in aforementioned drawing 2, and drawing 3 A is the perspective diagram of a development counter, and drawing showing the state where drawing 3 B removed the developer supply member from the aforementioned development counter.

[Drawing 4] Drawing 4 is the IV-IV line cross-section enlarged view of the aforementioned drawing 2 A.

[Drawing 5] Drawing 5 is the cross-section perspective diagram of the important section shown in aforementioned drawing 4.

[Drawing 6] Drawing 6 is important section expansion explanatory drawing of the example 2 of the developer of this invention.

[Description of Notations]

(N1, S1, N2, S2, N3) -- [ -- A development field R0 / -- A development roll R0a / -- A magnet roll R0b / -- A development sleeve R1 / -- The 1st conveyance member, R2 / -- It is a member the 2nd \*\*\*\*. ] A magnetic pole, N3 -- A pick-off magnetic pole (magnetic pole which makes a developer exfoliate), Q2 41 [ -- The 1st developer stirring field 44 / -- The 2nd developer stirring field, 45 / -- A bridge wall, 48 / -- The opening of the developer, 52 / -- Developer exhaust port ] -- A development container, 42 -- The development roll hold section, 43

[Translation done.]

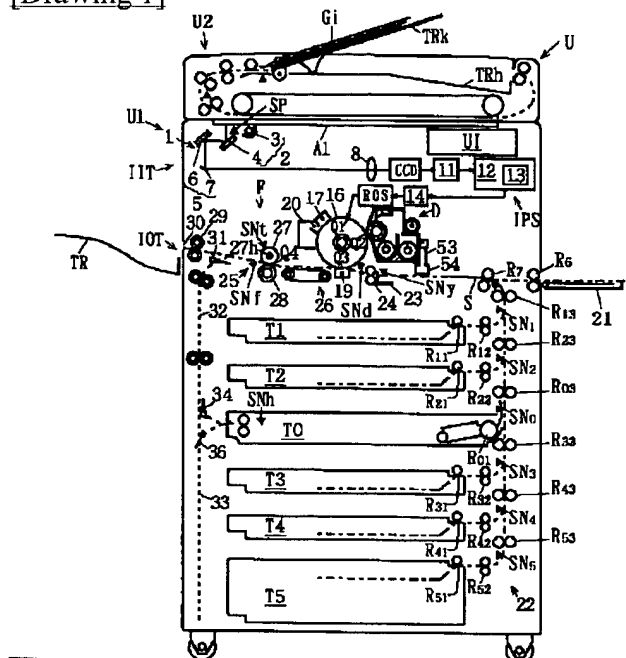
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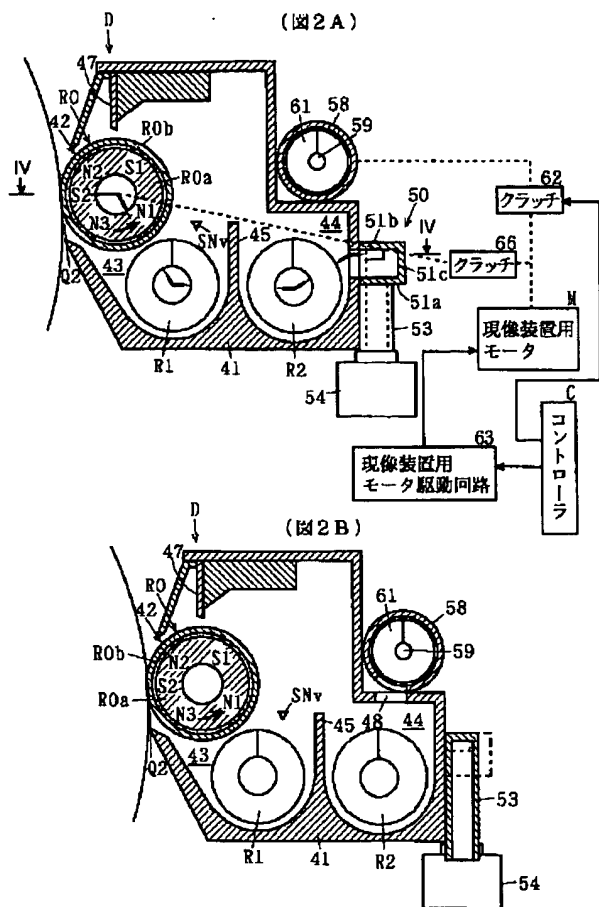
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## DRAWINGS

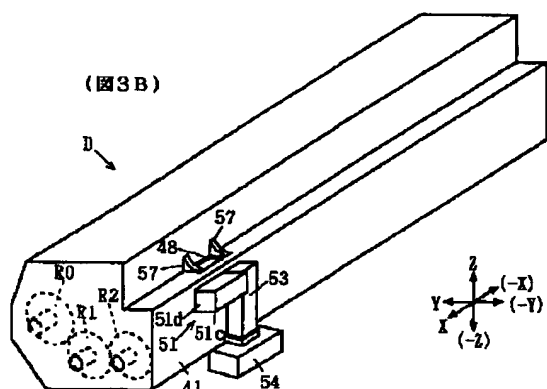
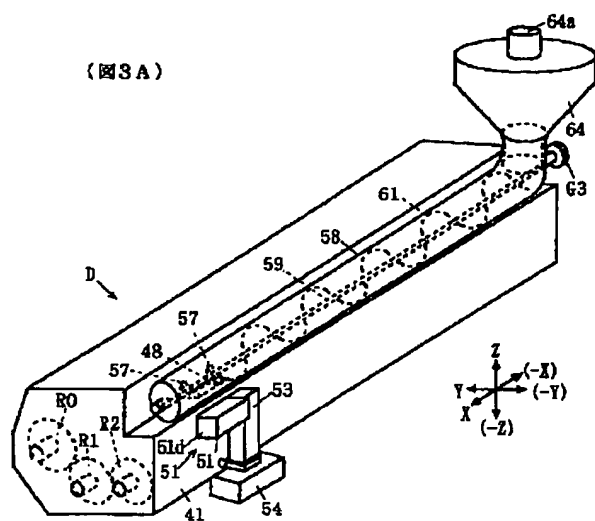
[Drawing 1]



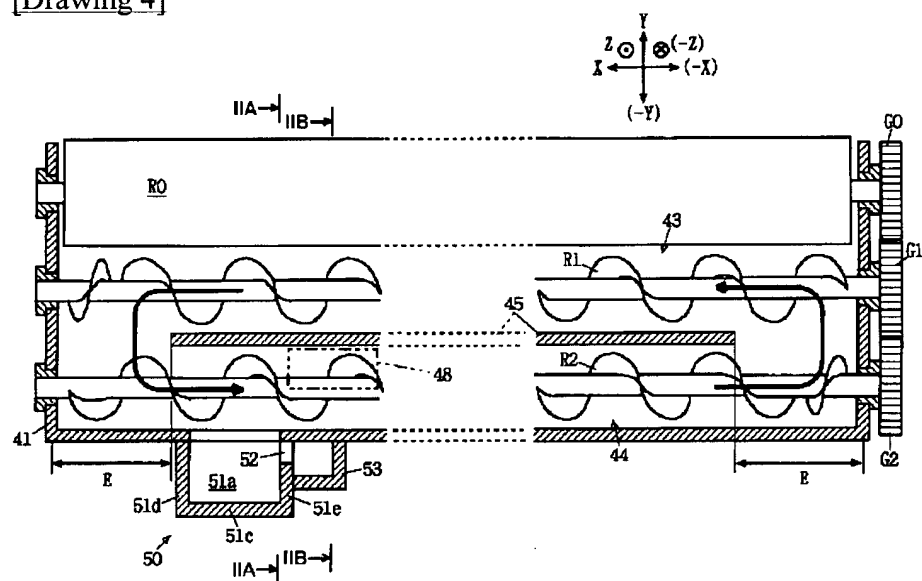
[Drawing 2]



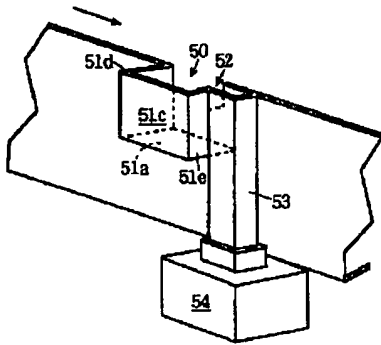
[Drawing 3]



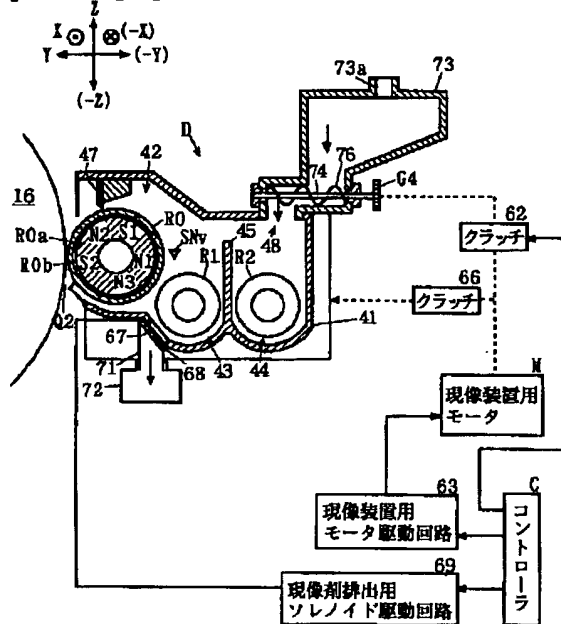
[Drawing 4]



[Drawing 5]



[Drawing 6]



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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the developer which uses 2 component developer which consists of a toner and a carrier especially in image formation equipments, such as an electrophotography copying machine and a LASER beam printer, about the developer which develops the electrostatic latent image formed on the image support in a toner image.

[0002]

[Description of the Prior Art] Conventionally, in the dry type copying machine etc., the developer which performs visualization of the electrostatic latent image on the front face of a photo conductor, i.e., development, with 2 component developer which consists of a toner and a carrier is used. In such a developer, while the toner is consumed by development operation, a carrier remains in a developer, without being consumed. Therefore, the situation of adhesion of the toner to a front face arises, it is polluted, and it deteriorates as stirring frequency of the carrier stirred with a toner within a developer increases. For this reason, by falling gradually, the electrification performance of a developer produces quality-of-image defects, such as a fogging (phenomenon in which the toner charged in reversed polarity when the electrification performance of a developer fell occurs, and a toner adheres to the non-picture section on a photo conductor at the time of development), and has become the cause of reducing quality of image remarkably.

[0003] Since it was made for quality-of-image defects, such as a fogging, not to arise until now, the developer with which it deteriorated in the development container periodically needed to be exchanged. And in order to exchange the developer, the effort of a great maintenance was applied. Then, for the purpose of doing the exchange work of a developer unnecessary, the developer which consists of mixture of a carrier and a toner is supplied in a development container, the degradation developer which carried out electrification performance degradation is discharged from a development container, and the developer which enabled it to suppress electrification performance degradation is proposed. as this kind of technology, the technology (J01) which is the following called "TORIKKURU development method" is known conventionally

[0004] (J01) apart from supply of the toner consumed, a new carrier is supplied in a development container, from the developer exhaust port prepared in the development vessel-wall side, the developer which is in the development container which became superfluous overflows, and is discharged, and the technology indicated by the official report of \*\*\*\*\* given in a JP,2-21591,B (JP,59-100471,A) official report is collected by the container for developer recycling By performing supply and ecrisis of such a carrier and a degradation developer repeatedly, the developer which is polluted within a development container and deteriorates is replaced by the toner and carrier which are newly supplied. Thereby, the electrification performance of a developer is maintained and deterioration of quality of image is suppressed.

[0005]

[Problem(s) to be Solved by the Invention]

(Trouble of the above (J01)) Although it was the composition which discharges with gravity the developer which overflowed from the developer exhaust port in the developer proposed above (J01), there was a trouble of being discharged instead of the developer supplied newly being a degradation developer since the eccentric position is not suitable.

[0006] this invention makes the following (O01) written content a technical problem in view of the above-mentioned situation.

(O01) Prevent that the developer newly supplied instead of the degradation developer is discharged, and exchange of a degradation developer and a new developer should be performed good.

[0007]

[Means for Solving the Problem] Next, although this invention thought out in order to solve the aforementioned technical problem is explained, in order to make easy correspondence with the element of the below-mentioned example, what surrounded the sign of the element of an example in the parenthesis is appended to the element of this invention. In addition, the reason for making this invention correspond with the sign of the below-mentioned example, and explaining it is for making an understanding of this invention easy, and is not for limiting the range of this invention to an example.

[0008] In order to solve the aforementioned technical problem, (This invention) The developer of this invention It is characterized by having the following requirements. (A01) 2 component developer which consists of a toner and a carrier The development roll which equipped the cylinder-like front face arranged at the cylinder-like development sleeve (R0b) and the aforementioned development sleeve (R0b) inside which are conveyed to a development field (Q2) with the magnet roll (R0a) which has two or more magnetic poles (N1, S1, N2, S2, N3) (R0), The development roll hold section in which the aforementioned development roll (R0) is held (42), (A02) The 1st developer stirring field which adjoins the aforementioned development roll hold section (42), and is prolonged in the shaft orientations of a development roll (R0) (43), And while adjoining the aforementioned 1st developer stirring field (43), being arranged at the aforementioned development roll (R0) and an opposite side and the portion except shaft-orientations both ends being divided by the bridge wall (45) with the aforementioned 1st developer stirring field (43) The 2nd developer stirring field formed between the container outer walls to which shaft-orientations both ends connect with the aforementioned 1st developer stirring field (43), and extend along with the aforementioned bridge wall (45) and its bridge wall (45) (44), The development container which has the developer exhaust port (52) which discharges the surplus developer of the opening of the developer (48) which is established in the aforementioned container outer wall and supplies new 2 component developer to the interior, and the interior (41), The 1st conveyance member stirred while it is arranged to the aforementioned 1st developer stirring field (43) and 2 component developer is conveyed in the direction of development roll axis (R1), (A03) The 2nd conveyance member stirred while it is arranged to the aforementioned 2nd developer stirring field (44) and 2 component developer is conveyed to the aforementioned 1st conveyance member (R1) and an opposite direction (R2), (A04) (A05) The aforementioned developer exhaust port which adjoined the aforementioned opening of the developer (48) and was formed in the developer flow direction upstream (52).

[0009] (Operation of this invention) In the developer of this invention equipped with the above-mentioned feature The development roll hold section in which a development container (41) holds a development roll (R0) (42), It has the 1st developer stirring field (43) which adjoins the aforementioned development roll hold section (42), and is prolonged in the shaft orientations of a development roll (R0), and the 2nd developer stirring field (44) which adjoined the aforementioned 1st developer stirring field (43), and has been arranged at the aforementioned development roll (R0) and the opposite side. The aforementioned 1st developer stirring field (43) It reached, and it was divided by the bridge wall (45) except for the aforementioned shaft-orientations both ends, and the 2nd developer churning field (44) is connected at the aforementioned shaft-orientations both ends. The 2nd conveyance member (R2) which has been arranged to the aforementioned 1st developer stirring field (43) and which reached the 1st conveyance member (R1) and has been arranged to the 2nd developer stirring field (44) is stirred conveying 2 component developer to an opposite direction mutually. Therefore, developer [ 1st ]



churning field (43) Reaching and circulating through the 2nd developer churning field (44), it is conveyed and the aforementioned 2 component developer is agitated. 2 component developer stirred while the aforementioned 1st developer churning field (43) was conveyed adheres to a development sleeve (R0b) by the magnetism of the magnetic pole (N1) of the aforementioned magnet roll (R0a), and is conveyed to the aforementioned development field (Q2).

[0010] Consumption of the aforementioned 2 component developer supplies a new developer in a development container (41) from the opening of the developer (48). Moreover, a surplus developer is discharged from the aforementioned developer exhaust port (52) which adjoined the aforementioned opening of the developer (48) and was formed in the developer flow direction upstream. Therefore, since a new developer is supplied to the position of the downstream which adjoined the aforementioned developer exhaust port (52), it cannot be discharged instead of a surplus developer and the exchange with a surplus developer and a new developer can be performed good, and it is stabilized, can maintain a fixed electrification performance, and can prevent deterioration of quality of image.

[0011]

[Embodiments of the Invention]

(Gestalt 1 of operation) The gestalt 1 of operation of the developer of this invention is the aforementioned development container which is characterized by having the following requirements in the aforementioned this invention and with which the developer exhaust port (52) was formed in the downstream edge of the aforementioned (A06) 1st stirring field (43), and the opening of the developer (48) was formed in the upstream edge of the aforementioned 2nd stirring field (44) (41).

(Operation of the gestalt 1 of operation) with the gestalt 1 of operation of this invention equipped with the above-mentioned composition, 2 component developer supplies from the opening of the developer (48) formed in the upstream edge of the 2nd stirring field (44) of a development container (41) -- having -- the [ the aforementioned 2nd stirring field (44) and ] -- it is stirred and conveyed in 1 churning field (43) And 2 component developer which deteriorated through the development process is discharged from the developer exhaust port (52) formed in the downstream edge of the aforementioned 1st stirring field (43). For this reason, 2 component developer by which supply was carried out [ aforementioned ] is supplied, and is not immediately discharged from a developer exhaust port (52).

[0012] (Gestalt 2 of operation) The gestalt 2 of operation of the developer of this invention is the aforementioned developer exhaust port formed near [ which is characterized by having the following requirements in either the aforementioned this invention or the gestalt 1 of operation ] the magnetic pole (N3) which makes the developer on the development sleeve (R0b) of the aforementioned (A07) magnet roll (R0a) exfoliate (52).

(Operation of the gestalt 2 of operation) With the gestalt 2 of operation of this invention equipped with the above-mentioned composition, the toner which constitutes the developer on the aforementioned development sleeve (R0b) is consumed by development operation. The aforementioned developer exfoliates from a development sleeve (R0b) by the magnetic pole (N3) which makes the developer of a magnet roll (R0a) exfoliate. The aforementioned developer which exfoliated is discharged from the developer exhaust port (52) formed near the aforementioned magnetic pole (N3). Therefore, the developer which was used by the development process and deteriorated is discharged and the supplied new developer is not discharged.

[0013]

[Example] Next, although the example (example) of the gestalt of operation of this invention is explained referring to a drawing, this invention is not limited to the following examples. The rectangular coordinates shaft X-axis, a Y-axis, and the Z-axis are defined in the direction of the arrows X, Y, and Z which intersect perpendicularly mutually in a drawing in order to make an understanding of future explanation easy, and it is a left about the front and the direction of arrow Y in the direction of arrow X. An arrow Z direction is made into the upper part. In this case, in back, the direction (left) of Y, and a retrose (the direction of -Y), the method of the right, a Z direction (upper part), and a retrose (- Z direction) serve as [ the direction of X (front), and a retrose (the direction of -X) ] a lower part. Moreover, it is called a cross direction or X shaft orientations including the front (the direction of X),

and back (the direction of -X), is called a longitudinal direction or Y shaft orientations including a left (the direction of Y), and the method of the right (the direction of -Y), and is made the vertical direction or Z shaft orientations including the upper part (Z direction) and a lower part (- Z direction). That "-" was furthermore indicated to be in drawing and "O" shall mean the arrow which goes to a table from the reverse side of space, and that "x" was indicated to be in "O" shall mean the arrow which goes to the front shell reverse side of space.

[0014] (Example 1) Drawing 1 is the image formation equipment whole explanatory drawing equipped with the example 1 of the developer of this invention. Drawing 2 is expansion explanatory drawing of a developer shown in aforementioned drawing 1, drawing 2 A is the IIA-IIA line cross section of drawing 4, and drawing 2 B is the IIB-IIB line cross section of drawing 4. Drawing 3 is explanatory drawing of the development container shown in aforementioned drawing 2, and drawing 3 A is the perspective diagram of a development counter, and drawing showing the state where drawing 3 B removed the developer supply member from the aforementioned development counter. Drawing 4 is the IV-IV line cross-section enlarged view of the aforementioned drawing 2 A. Drawing 5 is the cross-section perspective diagram of the important section shown in aforementioned drawing 4. Image formation equipment U is equipped with the copying machine U1 of the digital formula as a main part of image formation equipment which has platen glass (transparent manuscript base) A1 on the upper surface, and the automatic manuscript transport device U2 with which it is equipped free [ attachment and detachment ] on the aforementioned platen glass A1 in drawing 1. the aforementioned automatic manuscript transport device U2 has the manuscript medium tray TRk in which the manuscript Gi (i= -- 1, 2, --, n, and -- not shown) of the various sizes which it is going to copy is laid in piles The manuscript laid in the manuscript medium tray TRk is conveyed in the copy position on platen glass A1, and the manuscript [ finishing / a copy ] Gi is constituted so that it may be discharged by the manuscript delivery tray TRh.

[0015] The aforementioned copying machine U1 has UI (user interface), the image input terminal IIT (following, IIT) as a picture read station arranged one by one under the aforementioned platen glass A1 and the image output terminal IOT (following, IOT) as the operation section for image recording, and installation performance specification (image-processing system) prepared between Above IIT and IOT.

[0016] A user is the portion which carries out alter operation of the operation command signals, such as a copy start, and Above UI has the display, the copy start button, the copy setting number-of-sheets input key, etc. Presenting of the information about the present established state of image formation equipment U etc. is performed to the aforementioned display. IIT as a manuscript reader arranged under the platen glass A1 with the main part of copying machine U1 transparent upper surface has the exposure system register sensor (platen register sensor) Sp arranged in the platen register position (OPT position), and the exposure optical system 1. This exposure optical system 1 has the lamp unit 2 which can move, the lamp 3 and the 1st mirror 4 for manuscript lighting are unified, and this lamp unit 2 is constituted. Moreover, the aforementioned exposure optical system 1 has the move mirror unit 5 which moves at the rate of one half of the traverse speed of the aforementioned lamp unit 2. This move mirror unit 5 consists of the 2nd mirror 6 and the 3rd mirror 7.

[0017] And if the aforementioned lamp unit 2 moves to the longitudinal direction in drawing 1 in parallel to a manuscript and the aforementioned move mirror unit 5 moves only one half of distance at the rate of one half of the traverse speed of the aforementioned lamp unit 2, the distance between Manuscript Gi and a lens 8 will be kept constant. In that case, the reflected light of the manuscript Gi illuminated with the aforementioned lamp 3 is constituted so that it may converge on CCD (solid state image pickup device) through the aforementioned exposure optical system 1. Above CCD has the function to change into an electrical signal the manuscript reflected light which it converged on the image pck-up side.

[0018] Moreover, installation performance specification adjusts the gain of the analog electrical signal of the reading picture acquired by CCD (solid state image pickup device) of Above IIT, changes it into a digital signal, and has the picture reading data output means 11 which outputs by performing a shading compensation etc. Moreover, installation performance specification has a write-in image data output

means 12 by which the picture reading data which the aforementioned picture reading data output means 11 outputs are inputted, and the write-in image data output means 12 has the image memory 13 which memorizes image data temporarily. The write-in image data output means 12 performs data processing, such as concentration amendment and enlarging-or-contracting amendment, to the inputted aforementioned picture reading data, and has the function outputted to IOT as image data for writing (laser drive data).

[0019] The laser driving-signal output unit 14 of IOT into which the picture write data (laser drive data) which the write-in image data output means 12 of Above installation performance specification outputs is inputted outputs the laser driving signal according to the inputted image data to ROS (a scanner write-in [ optical ], i.e., latent-image formation equipment). Above ROS scans the electrostatic latent-image write-in position Q1 of image support 16 front face to rotate by the laser beam modulated by the inputted aforementioned laser driving signal. Along with the hand of cut, the charger 17 for electrification is arranged at the upstream of the aforementioned latent-image write-in position Q1 at the image support 16 circumference of the above, Developer D is arranged one by one in the development position Q2 at the downstream of the aforementioned latent-image write-in position Q1, the imprint machine 19 is arranged in the imprint position Q3, and the cleaner unit 20 is arranged further at the downstream. In addition, between the aforementioned development position Q2 and the imprint position Q3, the toner image concentration sensor SNd which detects the concentration of the toner image (namely, patch) of a small area formed on the image support 16 is arranged.

[0020] Moreover, the middle tray T0 for [ temporarily ] a stock used at the time of the 1st medium tray T1 which goes caudad and holds a sheet one by one, the 2nd medium tray T2, and a double-sided copy etc., the 3rd medium tray T3, the 4th medium tray T4, and the 5th medium tray T5 that holds an extensive sheet are contained free [ attachment and detachment ] by the aforementioned main part U1 of a copying machine. and the 1st medium tray T1 of the above -- corresponding -- the [ the 1st delivery roll R11 and ] -- it sells one, roll equipment R12 and the 1st TEIKU away roll equipment R13 are arranged, and the 1st feed sensor SN1 is arranged before the aforementioned 1st TEIKU away roll equipment R13 and each aforementioned medium trays T2-T5 -- also receiving -- the same delivery roll R21 and -- R51 -- selling -- roll equipment R22 and -- R52, TEIKU away roll equipment R23, and -- R53, the feed sensor SN2, and the --SN5 grade are arranged Moreover, to the aforementioned middle tray T0, a delivery roll R01, TEIKU away roll equipment R03, and the feed sensor SN0 grade are arranged. The middle tray T0 is a tray used when circulating record sheet (following sheet) S to which the 1st copy was performed on the occasions, such as a double-sided copy or a multiplex copy, and resending to the aforementioned imprint position Q3.

[0021] The manual feed tray 21 is formed in the right-hand side upper part position of the 1st medium tray T1 of the above. Each sheet sent out from the sheet conveyed with the rollers R6 and R7 for feeding and each aforementioned medium trays T1-T5 is conveyed through the 1st sheet conveyance way 22 in the aforementioned imprint position Q3 from a manual feed tray 21. The sheet which has the 1st sheet conveyance way 22 conveyed is detected by the aforementioned 1st feed sensor SN1 and the sheet register sensor SNy. After making the termination of the aforementioned 1st sheet conveyance way 22 suspend the sheet S conveyed by the sheet conveyance direction upstream of the aforementioned imprint position Q3, the register gate 23 and the register roll 24 for carrying in to the aforementioned imprint position Q3 are arranged. The aforementioned imprint machine 19 arranged in the imprint position Q3 makes the sheet S which passes through the imprint position Q3 imprint the toner image of image support 16 front face. Image support 16 front face which passed through the aforementioned imprint position Q3 is again charged uniformly with the aforementioned electrification vessel 17, after the toners which remained on the front face are collected by the aforementioned cleaner unit 20.

[0022] The sheet S which had the toner image imprinted is conveyed in the fixing position Q4 through the conveyance belt 26 of the 2nd sheet conveyance way 25 linked to the sheet eccrisis tray TR in the aforementioned imprint position Q3. The fixing equipment F which has the fixing rolls 27 and 28 of the couple which consists of a heating roller 27 and a pressure roll 28 is arranged in the fixing position Q4, and it is constituted so that the non-established toner image on the sheet S which passes through the

fixing position Q4 may be established by heating pressurization. Heater 27h for fixing is built in the fixing roll 27 interior of the above. In addition, it is detected by the fixing temperature sensor SNt, and fixing equipment F is adjoined, the fixing equipment eccentric sensor SNf is arranged at the downstream, and heating roller 27 skin temperature is \*\*\*\*\*. The eccentric roller 29 for discharging a sheet at the sheet eccentric tray TR is formed in the aforementioned 2nd sheet conveyance way 25 at the downstream of the aforementioned fixing position Q4.

[0023] The change gate 31 is arranged on the aforementioned 2nd sheet conveyance way 25 at the upstream of the aforementioned eccentric roller 29. The change gate 31 is used in case the conveyance direction of the sheet S on the aforementioned 2nd sheet conveyance way 25 is changed in the direction of the sheet circuit 32 or the aforementioned sheet eccentric tray TR. The sheet circuit 32 is connected to the sheet reversal way 33 and the aforementioned middle tray T0 via the change gate 34. The aforementioned change gate 34 makes the sheet S of the sheet circuit 32 go to the sheet reversal way 33, when performing a double-sided copy, and it is made to go at the direct middle tray T0 in a multiplex copy. In case the sheet S to pass is conveyed caudad, when movement in the lower part of Sheet S is allowed by elastic deformation, the sheet S which passed through the Mylar gate 36 switchbacks and it is conveyed up, the Mylar gate 36 of the shape of a sheet prepared in the aforementioned sheet reversal way 33 and the toothed of a comb is constituted so that it may guide in the direction of the middle tray T0. The sheet S once held in the middle tray T0 is constituted so that it may be re-conveyed by the aforementioned 1st sheet conveyance way 22 from the middle tray T0 in the aforementioned imprint position Q3.

[0024] In drawing 2, the developer D which countered the image support 16 and has been arranged in the development field Q2 has the development container 41 which holds 2 component developer which consists of the toner of negative-electrode electrification nature, and the magnetic carrier of positive-electrode electrification nature. The aforementioned development container 41 has 2nd developer \*\*\*\*\* 44 which is the 2nd developer stirring field which adjoins 1st developer \*\*\*\*\* 43 which is the 1st developer stirring field which adjoins the development roll hold section 42 and the aforementioned development roll hold section 42 which hold the development roll R0, and developer \*\*\*\*\* 43 of the above 1st. As shown in drawing 4, between developer \*\*\*\*\* 43 of the above 1st, and 2nd developer \*\*\*\*\* 44, the bridge wall 45 is formed in portions other than those both ends, and 1st developer \*\*\*\*\* 43 and 2nd developer \*\*\*\*\* 44 are connected in the connection E of the cross-direction (X shaft orientations) both ends. In drawing 4, the 1st conveyance member R1 is arranged at developer \*\*\*\*\* 43 of the above 1st, and the 2nd conveyance member R2 is arranged at developer \*\*\*\*\* 44 of the above 2nd.

[0025] Moreover, as shown in drawing 2, in the development roll hold section 42, the thickness specification-part material 47 for regulating the thickness of the developer on the aforementioned development roll R0 is arranged. Furthermore, the opening 48 (refer to drawing 2 B) of the developer is formed in the upper surface of developer \*\*\*\*\* 44 of the above 2nd. The developer stay section 50 which bulges in the method of outside from the outside side of the development container 41 is formed in developer \*\*\*\*\* 44 of the above 2nd. The developer stay section 50 is formed with the method projection wall 51 of outside which has base 51a, upper surface 51b, side-attachment-wall 51c parallel to the side attachment wall of aforementioned developer \*\*\*\*\* 44, 51d of upstream end walls arranged at the downstream of a developer which has aforementioned developer \*\*\*\*\* 44 conveyed, and downstream end-wall 51e. The developer exhaust port 52 (refer to drawing 4) is formed in the portion near aforementioned developer \*\*\*\*\* 44 at aforementioned downstream end-wall 51e. The developers discharged from the developer exhaust port 52 are collected through the developer exhaust passage 53 by the container 54 for developer recycling. The aforementioned developer reservoir 50 is formed in the field (field except the connection E of an order edge) which is a field of developer \*\*\*\*\* 44 of the above 2nd shown in drawing 4, and was divided by the aforementioned bridge wall 45 with developer \*\*\*\*\* 43 of the above 1st. The aforementioned field is a field where it was divided with the aforementioned bridge wall 45 from 1st developer \*\*\*\*\* 43 to which the surface height of a developer is changed by rotation of the development roll R0, and the flow of a developer was limited in the fixed

direction, and is a field by which the upper surface position of a developer was stabilized. In addition, in order to lessen the rate discharged immediately after the supplied new developer supplying, the aforementioned opening 48 of the developer is formed in the conveyance direction downstream from the position of the aforementioned developer stay section 50. As mentioned above, the development container 41 (42-53) in this example consists of elements shown with the aforementioned signs 42-53.

[0026] drawing 4 -- setting -- the [ the above 1st and ] -- the gears G1 and G2 for [ driven ] which 2 conveyance members R1 and R2 are constituted by the screw for conveyance with which the circumference of the axis of rotation was equipped, and gear mutually in the back end section (-X side edge section) of each shaft have fixed. Moreover, the gear G1 of the aforementioned 1st conveyance member R1 has geared on the gear G0 with which the back end section (-X side edge section) of the shaft of the aforementioned development roll R0 was equipped. If turning effort is transmitted by the motor M for developers (refer to drawing 2 ) and a gear G0 rotates, it is constituted by the aforementioned gear G0 so that the gears G1 and G2 of each other may also be rotated to an opposite direction. the [ and / the aforementioned gears G1 and G2, the above 1st which rotates in one, and ] -- by 2 conveyance members R1 and R2, as shown in drawing 4 , a developer circulates within the above 1st, 2nd developer \*\*\*\*\* 43, and 44

[0027] The aforementioned development roll R0 has magnet roll R0a fixed to the development container 41, and development sleeve R0b arranged free [ rotation on the outside ]. The aforementioned magnet roll R0a is located near the pickup magnetic pole N1 and the aforementioned thickness specification-part material 47 which make a developer stick to development sleeve R0b. The trimming magnetic pole S1 and developer which participate in developer thickness It is constituted by pick-off \*\*\*\* N3 which makes the conveyance magnetic pole N2 to convey, the development magnetic pole S2 which is made to move a toner onto the image support 16, and is developed in a toner image, and the developer which remains on development sleeve R0b after a development process end exfoliate from development roll R0 front face. With rotation of the aforementioned development roll R0, the developer of developer \*\*\*\* 43 of the above 1st adheres to the front face of the aforementioned development roll R0, and is conveyed in the aforementioned development position Q2.

[0028] In drawing 3 B, the developer filling-neck-appendix retaining walls 57 and 57 are arranged before and behind the aforementioned opening 48 of the developer. As shown in drawing 3 A, the developer filling neck appendix 58 has pasted the developer filling-neck-appendix retaining walls 57 and 57. In drawing 2 and drawing 3 , the developer conveyance auger 61 with which the auger axis-of-rotation 59 and auger axis-of-rotation 59 circumference was equipped is arranged possible [ rotation ] in the developer filling neck appendix 58. Gear G3 is being fixed to the end of the aforementioned auger axis of rotation 59, and gear G3 is connected to the motor M for developers through the clutch 62 (refer to drawing 2 A). The motor M for developers is driven by the motorised circuit 63 for developers which the controller C which controls operation of a copying machine U1 controls.

[0029] The developer storage container 64 is connected to the end of the aforementioned developer filling neck appendix 58. Filling-neck-appendix 64a is prepared in the upper surface of the aforementioned developer storage container 64, and 2 component developer with the high toner concentration supplied from here (henceforth a "high concentration developer") is stored in the aforementioned developer storage container 64. The high concentration developer carried in in the developer filling neck appendix 58 from the aforementioned developer storage container 64 is conveyed by the aforementioned developer conveyance auger 61 which the aforementioned motor M for developers is driving, and carries out a rotation drive when a clutch 62 is ON, and is supplied in 2nd developer \*\*\*\*\* 44 from the opening 48 of the developer. Supply of this high concentration developer is performed when the toner concentration Tb in a container which the toner concentration sensor SNv (refer to drawing 2 ) in a container arranged in the development container 41 detects at the time of anticipated use is below the reference value Tbo. In addition, supply of a high concentration developer is performed when the development toner image concentration detected to predetermined timing by the aforementioned toner image concentration sensor SNd (refer to drawing 1 ) is below a reference value. Moreover, rotation of the aforementioned motor M for developers is constituted so that it may be

transmitted to the aforementioned gear G0 through a clutch 66 (refer to drawing 2 A).

[0030] (Operation of an example 1) The developer of this invention equipped with the above-mentioned composition sets example 1, and the image support 16 is uniformly charged in negative polarity in the front face with electrification equipment 17. Next, ROS is exposed and an electrostatic latent image is formed in the front face of the image support 16 of it. It rotates in the direction which conflicts mutually, and let the 1st in the aforementioned development container 41 of Developer D, the 1st which were held in 2nd developer \*\*\*\* 43 and 44, and the 2nd conveyance members R1 and R2 be the developers of two homogeneous components with which triboelectrification was made by the mixed operation with a toner and a carrier while they stir and convey the high concentration developer supplied from the opening 48 of the developer. This 2 component developer mixed uniformly is made to adsorb in layers on a development sleeve R0b peripheral surface by the magnetism of the pickup magnetic pole N1 of magnet roll R0a (pickup). The developer of the front face of the development roll R0 is formed in a uniform layer of the aforementioned thickness specification-part material 47. The uniform developer layer formed in the front face of the aforementioned development roll R0 develops the electrostatic latent image on the image support 16 in a toner image in the development field Q2. After a development process end, the developer which remains on the development roll R0 exfoliates by the pick-off magnetic pole N3 from development roll R0 (namely, development sleeve R0b) front face (pick off), and is stirred and conveyed again.

[0031] After the sheets S, such as a record sheet by which a toner image is imprinted, or transparent imprint material, are taken out and conveyed from medium trays T0-T5 and are made to stop at the register gate 23, they are conveyed to predetermined timing with the register roll 24 in the imprint position Q3 between the image support 16 and the imprint machine 19. In the imprint position Q3, the toner image on the image support 16 is imprinted on Sheet S with the imprint vessel 19. And the sheet S with which the toner image was imprinted is fixing equipment F, and heating fixing is carried out and it is discharged by the sheet discharge tray TR. The toner with which the aforementioned image support 16 which finished the imprint of a toner image remained in the front face by the cleaner unit 20 after that is written.

[0032] If the above copy operation is repeated, the toner in the developer contained in the development container 41 of the developer D of aforementioned drawing 2 is consumed gradually, and it falls, the ratio, i.e., the toner concentration, of the toner to a carrier. Change of this toner concentration is detected by the toner concentration sensor SNv in a container formed in the development container 41. If the aforementioned toner concentration Tb in a container becomes below a proper range required for development, the aforementioned controller C will turn ON the aforementioned clutch 62, will drive the developer conveyance auger 61, and will supply the high concentration developer in the developer storage container 64 in the development container 41 from the opening 48 of the developer.

[0033] On the other hand, the carrier in the developer in the development container 41 is not consumed by development operation, and it stirs together with a toner within the development container 41, or toner adhesion on a carrier front face arises under the influence of contact to the image support 16 and a toner etc. in the influence of the magnetism of the magnet roller of the development roll R0, and a row, a front face etc. is polluted gradually, and it deteriorates. Thus, when the carrier deteriorates, a developer electrification performance will fall, it will become impossible to give the predetermined amount of electrifications to a toner, and deterioration of quality of image will be produced. In drawing 4, the developer which circulates through the above 1st and 2nd developer \*\*\*\* 43 and 44 piles up in the developer stay section 50 formed with the method projection wall 51 of outside formed in developer \*\*\*\* 44 side attachment wall. It is the developer which is piling up in the developer stay section 50, and the developer of the portion near aforementioned developer \*\*\*\* 44 is dragged by the developer which has developer \*\*\*\* conveyed, and moves. This developer is discharged by the developer exhaust passage 53 from the developer exhaust port 52 formed in the portion near aforementioned developer \*\*\*\* 44 of the aforementioned downstream end-wall 51e. The discharged developers are collected by the container 54 for developer recycling.

[0034] The position of the opening 48 of the developer is in the developer flow direction downstream of

the developer exhaust port 52. For this reason, without being discharged, the new developer supplied from the opening 48 of the developer is stirred, and is conveyed to the development field Q2. Therefore, within a development container, it becomes possible to come to perform the exchange with the developer which is discharged and which deteriorated, and a new developer good, to be stabilized, to be able to maintain a fixed electrification performance, and to maintain high definition.

[0035] (Example 2) Drawing 6 is important section expansion explanatory drawing of the example 2 of the developer of this invention. In this example 2, the detailed explanation which gives the same sign to the element corresponding to the element of an example 1, and overlaps is omitted. In this example 2, the developer exhaust port 67 is formed instead of the developer exhaust port 52 prepared in the 2nd [ of the aforementioned example 1 ] developer \*\*\*\*\* 44 side. The developer exhaust port 67 is near the pick-off magnetic pole N3 of magnet roll R0a, and is formed in development container 41 outer wall of the lower part of the development roll R0. The shutter 68 for developer discharge is formed in the aforementioned developer exhaust port 67. The shutter 68 for developer discharge is opened and closed by the cross direction (X shaft orientations) by the solenoid for developer discharge which has been arranged at the posterior (it sets to the -X side and drawing 6 , and is the background of the shutter 68 for developer discharge) and which is not illustrated. The solenoid drive circuit 69 for developer discharge which Controller C controls. The container 72 for developer recycling which collects the developers discharged through the developer exhaust passage 71 is arranged at the lower part of the aforementioned developer exhaust port 67. In addition, in this example 2, the developer stay section 50 of the aforementioned example 1 is not formed. Moreover, 2 component developer which was supplied to the opening 48 of the developer of the development container 41 from feed-hopper 73a of the developer storage container 73, and was stored in the aforementioned container consists of this examples 2 so that it may be supplied by the developer conveyance auger 76 currently supported by the auger axis of rotation 74 and this. The aforementioned auger axis of rotation 74 is connected to the clutch 62 and the motor for developers through the gear G4 of the heel, and when a clutch 62 is ON, rotation of the aforementioned motor is transmitted through the aforementioned gear G4.

[0036] The developer newly supplied by this example 2 by the above-mentioned composition is stirred, and is conveyed by the development roll R0. This developer is adsorbed on the front face of development sleeve R0b by the pickup magnetic pole N1 of magnet roll R0a. The developer with which it adsorbed is carried to the development field Q2, and develops the electrostatic latent image on the image support 16 in a toner image. The developer which remains on development sleeve R0b exfoliates from development roll R0 front face by the pick-off magnetic pole N3 after a development process end. The solenoid for developer discharge which is not illustrated by the solenoid drive circuit 69 for developer discharge controlled by KOTORORA C operates, and the shutter 68 for developer discharge opens. The developer which exfoliated from the aforementioned developer exhaust port 67 by this is discharged. Thus, the developer exhaust port 67 is near the pick-off magnetic pole N3 of magnet roll R0a, and since it is formed in development container 41 outer wall of the lower part of the development roll R0, after the developer supplied newly is taken up on the 1-time or more development roll R0 and is used for a development process, it is discharged from the developer exhaust port 67. Therefore, the carrier or developer just supplied can prevent being discharged from a developer exhaust port as it is.

[0037] (Example of change) Although the example of this invention was explained in full detail above, this invention can make various change within the limits of the summary of this invention which is not limited to the aforementioned example and indicated by the claim. The change example of this invention is illustrated below.

(H01) this invention can be applied to an analog copying machine, a printer, facsimile, etc. in addition to a digital copier.

(H02) Instead of one developer storage container 64 which held the high concentration developer with high toner concentration constituting a developer storage container in each aforementioned example, it is possible for two storage containers, a toner storage container and a carrier storage container, to constitute, and to control supply of a toner and a carrier separately. Moreover, it is also possible to



constitute the aforementioned developer storage container with two containers, a container and a toner storage container, which stored the high concentration developer with high toner concentration.

(H03) this invention can also arrange a paddle between a development roll and the 1st conveyance member.

(H04) forming the developer stay section and developer exhaust passage of this invention in one with the container outer wall of a development container \*\*\*\* -- or the aforementioned container outer wall - - receiving -- desorption -- forming easily is possible

(H05) The developer exhaust port of this invention can also be prepared in the lower part of a development container outer wall instead of preparing in the upper part side of a development container outer wall. Moreover, the developer stay section is omissible.

[0038]

[Effect of the Invention] The developer of the above-mentioned this invention can do the following effect so.

(E01) It can prevent that the developer newly supplied instead of the degradation developer is discharged, and a degradation developer and a new developer can be replaced good. Therefore, it is stabilized, a fixed electrification performance can be maintained and high definition can be maintained.

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[Translation done.]